



RF MEASUREMENT REPORT

FCC ID: 2A82LSPOT-V1
Application: Nova Labs, Inc.
Product: Spot Mapper
Model No.: Spot-US
Brand Name: Helium
FCC Rule Part(s): Part 2, 22 (H), 24 (E), 27
Result: Complies
Test Date: 2022-09-27 ~ 2022-11-16

Reviewed By:

Sunny Sun

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2209RSU059-U9	Rev. 01	Initial Report	2023-01-04	Invalid
2209RSU059-U9	Rev. 02	Modify the Product Name	2023-01-06	Valid

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1.1. Applicant

2202 South Figueroa #408, Los Angeles, California, United States

Nova Labs, Inc.

2202 South Figueroa #408, Los Angeles, California, United States

☒	Test Site – MRT Suzhou Laboratory				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
A2LA: 3628.01		CNAS: L10551			
FCC: CN1166		ISED: CN0001			
VCCI:	☐ R-20025	☐ G-20034	☐ C-20020	☐ T-20020	
	☐ R-20141	☐ G-20134	☐ C-20103	☐ T-20104	
☐	Test Site – MRT Shenzhen Laboratory				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	Test Site – MRT Taiwan Laboratory				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725		FCC: 291082, TW3261		
ISED: TW3261					

1.4. Product Information

Product Name	Spot Mapper
Model No.	Spot-US
Brand Name	Helium
Test IMEI	Conducted measurement: 868692050102784 Radiated measurement: 868692050107718
E-UTRA Band	FDD Band: 2, 4, 5, 66, 71 TDD Band: 48
NR Band	TDD Band: n41, n48
Wi-Fi Specification	802.11 b/g/n/ac/ax
Bluetooth Specification	V5.1 dual mode
Lora Specification	902 ~ 928 MHz
Operating Temperature	-20 ~ 55 °C
Integrated WWAN Modular Information	
Model No.	RM505Q-AE
FCC ID	XMR2020RM505QAE
Brand Name	Quectel
Integrated BT & Wi-Fi Modular Information	
Model No.	FG50V
FCC ID	XMR202103FG50V
Brand Name	Quectel
Integrated Lora Modular Information	
Model No.	LoRa-E5-HF
FCC ID	Z4T-LORA-E5
Brand Name	Seeed
Accessories	
Rechargeable Li-ion Battery	Model No.: QDM044 Rated Voltage: 3.8V Rated Capacity: 4000mAh/15.2Wh Limited Charge Voltage: 4.35V
Remark:	
- The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. - This device is based on certification module, FCC ID "XMR2020RM505QAE" to assessing the radiated spurious emission.	

1.5. Radio Specification Under Test

FDD Tx Frequency Range:	Band 2: 1850 ~ 1910 MHz; Band 4: 1710 ~ 1755 MHz Band 5: 824 ~ 849 MHz; Band 66: 1710 ~ 1780 MHz Band 71: 663 ~ 698 MHz
FDD Rx Frequency Range:	Band 2: 1930 ~ 1990 MHz; Band 4: 2110 ~ 2155 MHz Band 5: 869 ~ 894 MHz; Band 66: 2110 ~ 2200 MHz Band 71: 617 ~ 652 MHz
Support Bandwidth:	Band 2/4/66: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz Band 5: 1.4MHz, 3MHz, 5MHz, 10MHz Band 71: 5MHz, 10MHz, 15MHz, 20MHz
Modulation	UL & DL up to 256QAM
Antenna Information	PIFA Antenna, Band 2: 1.86dBi, Band 4/66: 3.45dBi, Band 5: -7.7dBi Band 71: 0.94dBi

1.6. EIRP and Emission Designator

Technology	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Max EIRP (dBm)	Emission Designator
LTE Band 2	1850 ~ 1910	20.18	1.86	22.04	17M9G7D
		20.21		22.07	4M44G7D
		19.57		21.43	17M8W7D
		19.60		21.46	13M4W7D
LTE Band 4/66	1710 ~ 1780	19.88	3.45	23.33	17M9G7D
		19.03		22.48	17M9W7D
		19.05		22.50	8M93W7D
LTE Band 5	824 ~ 849	23.13	-7.7	15.43	8M94G7D
		23.23		15.53	4M48G7D
		22.58		14.88	8M93W7D
		22.67		14.97	4M47W7D
LTE Band 71	663 ~ 698	23.02	0.94	23.96	17M8G7D
		23.02		23.96	4M48G7D
		22.37		23.31	17M9W7D
Remark: The Max conducted power extracted from the SAR test report and emission designator extracted from FCC ID “XMR2020RM505QAE”.					

1.7. Test Methodology

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC CFR 47 Part 2, Part 22, Part 24, Part 27
- ANSI C63.26:2015

1.8. Device Capabilities

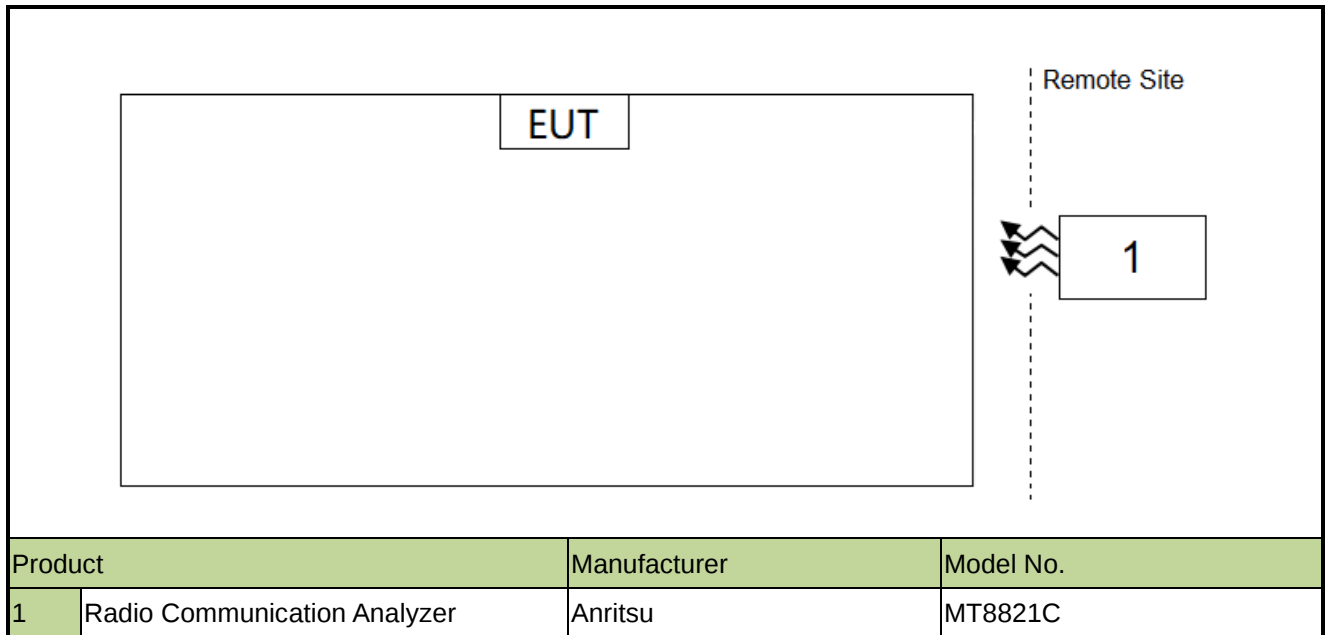
This device contains the following capabilities:

LTE Band 66 (1710 ~ 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 ~ 1755 MHz).

Therefore, test data provided in this report covers Band 4 as well as Band 66.

2. Test Configuration

2.1. Test System Connection Diagram



2.2. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
5G Wireless Test Platform	Keysight	E7515B	MRTSUE06942	1 year	2023-03-03	WZ
Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2023-07-08	WZ
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2023-05-20	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2023-06-04	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2022-12-01	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2023-05-08	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2023-04-21	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2

Software	Version	Manufacturer	Function	Date	Location
EMI V3	V 3.0.0	Quietek	EMI Test Software	2010.01	EMC-WZ
Controller_MF 7802	1.02	MF	RE Antenna & Turntable	2015-07-05	EMC-WZ-AC2

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.

(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Spurious Emissions

Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):

Horizontal: 9kHz ~ 300MHz: 5.04dB

300MHz ~ 1GHz: 4.95dB

1GHz ~ 40GHz: 6.40dB

Vertical: 9kHz ~ 300MHz: 5.24dB

300MHz ~ 1GHz: 6.03dB

1GHz ~ 40GHz: 6.40dB

5. Test Result

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
2.1053, 22.917(a) 24.238(a), 27.53 (h)	Spurious Emissions (Band 2, 4/66, 5, 71)	Radiated	Pass

Notes:

- 1) The worst-case emission of modulation was selected. Radiated Spurious Emission (include the Intra-Band CA Mode) were presented the worst-case in the test report.

5.2. Radiated Spurious Emissions Measurement

5.2.1. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

E (dBμV/m) = EIRP (dBm) - $20 \log D$ + 104.8; where D is the measurement distance in meters. The emission limit equal to 82.3dBμV/m.

5.2.2. Test Procedure

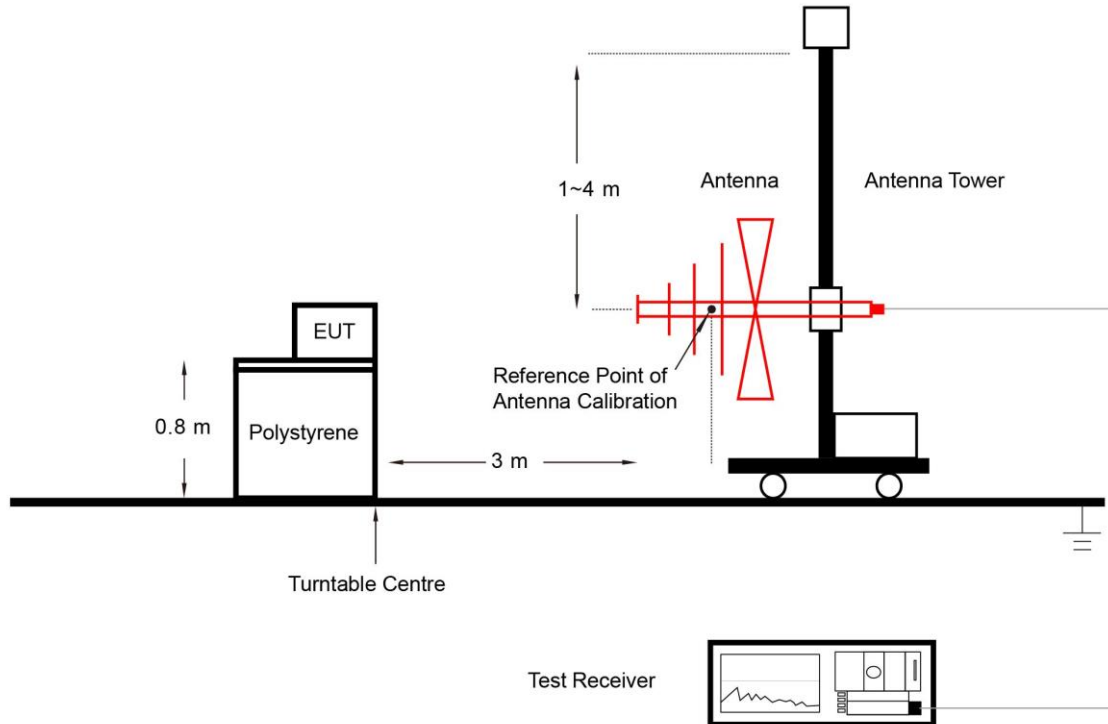
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.2.3. Test Setting

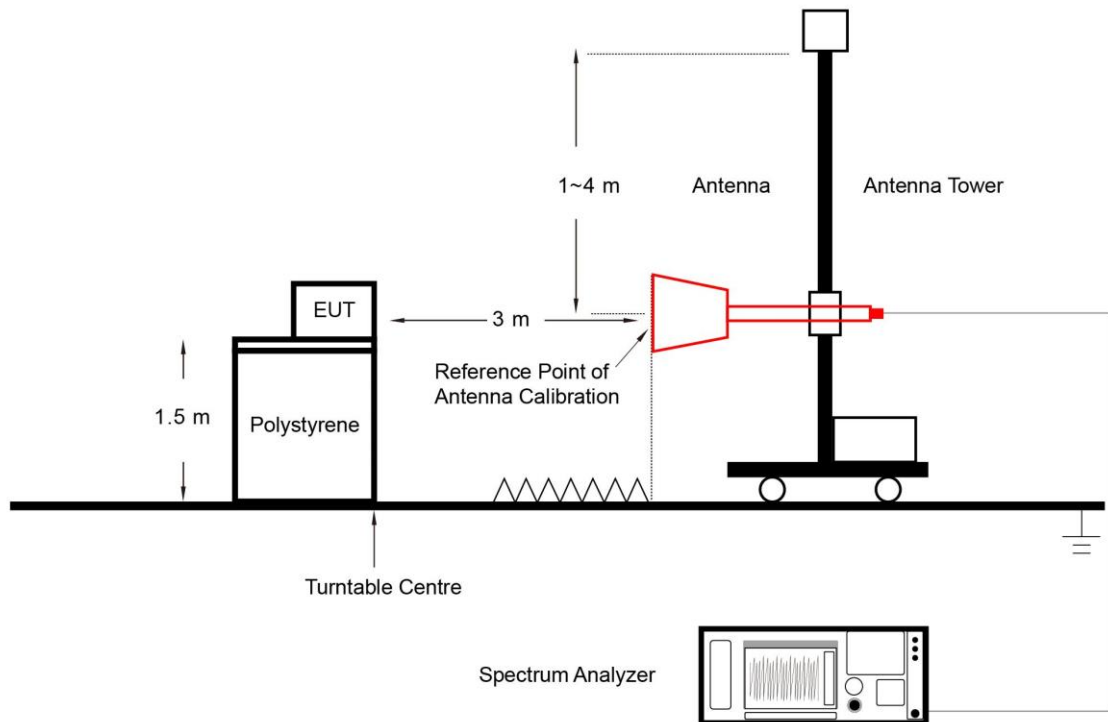
1. RBW = 1MHz
2. VBW $\geq 3 \times$ RBW
3. Sweep time $\geq 10 \times$ (number of points in sweep) $\times$ (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.2.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.2.5. Test Result

Refer to Appendix A.1.

Appendix A - Test Result

A.1 Radiated Spurious Emissions Test Result

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	LTE Band 2, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
40.7	3.0	18.9	21.9	82.3	-60.4	Peak	Horizontal
662.9	4.7	27.9	32.6	82.3	-49.7	Peak	Horizontal
35.8	9.9	17.4	27.3	82.3	-55.0	Peak	Vertical
600.4	4.0	26.9	30.9	82.3	-51.4	Peak	Vertical
4187.5	36.6	1.2	37.8	82.3	-44.5	Peak	Horizontal
10452.0	32.3	15.9	48.2	82.3	-34.1	Peak	Horizontal
5063.0	35.8	4.2	40.0	82.3	-42.3	Peak	Vertical
11132.0	31.2	17.3	48.5	82.3	-33.8	Peak	Vertical
Middle Channel							
56.2	1.8	20.1	21.9	82.3	-60.4	Peak	Horizontal
729.9	4.1	28.9	33.0	82.3	-49.3	Peak	Horizontal
35.8	10.8	17.4	28.2	82.3	-54.1	Peak	Vertical
645.0	4.3	27.5	31.8	82.3	-50.5	Peak	Vertical
4825.0	37.1	3.8	40.9	82.3	-41.4	Peak	Horizontal
11115.0	31.0	17.5	48.5	82.3	-33.8	Peak	Horizontal
4587.0	35.9	2.8	38.7	82.3	-43.6	Peak	Vertical
10562.5	32.1	15.9	48.0	82.3	-34.3	Peak	Vertical
High Channel							
50.4	1.0	20.4	21.4	82.3	-60.9	Peak	Horizontal
592.6	4.3	26.9	31.2	82.3	-51.1	Peak	Horizontal
34.9	11.6	17.2	28.8	82.3	-53.5	Peak	Vertical
597.9	3.7	26.9	30.6	82.3	-51.7	Peak	Vertical
4604.0	35.5	3.0	38.5	82.3	-43.8	Peak	Horizontal
10775.0	30.7	17.1	47.8	82.3	-34.5	Peak	Horizontal
3822.0	38.4	0.1	38.5	82.3	-43.8	Peak	Vertical
10919.5	31.1	17.3	48.4	82.3	-33.9	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	LTE Band 4/66, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
54.3	2.0	20.3	22.3	82.3	-60.0	Peak	Horizontal
407.8	2.6	23.3	25.9	82.3	-56.4	Peak	Horizontal
35.3	10.5	17.3	27.8	82.3	-54.5	Peak	Vertical
591.1	2.7	26.9	29.6	82.3	-52.7	Peak	Vertical
5063.0	35.3	4.2	39.5	82.3	-42.8	Peak	Horizontal
11123.5	31.0	17.4	48.4	82.3	-33.9	Peak	Horizontal
4204.5	36.6	1.2	37.8	82.3	-44.5	Peak	Vertical
10826.0	31.5	17.6	49.1	82.3	-33.2	Peak	Vertical
Middle Channel							
47.9	2.3	20.3	22.6	82.3	-59.7	Peak	Horizontal
589.2	3.5	26.9	30.4	82.3	-51.9	Peak	Horizontal
35.8	11.1	17.4	28.5	82.3	-53.8	Peak	Vertical
66.4	5.5	18.0	23.5	82.3	-58.8	Peak	Vertical
4901.5	35.2	3.7	38.9	82.3	-43.4	Peak	Horizontal
8165.5	33.3	11.9	45.2	82.3	-37.1	Peak	Horizontal
6482.5	35.3	7.8	43.1	82.3	-39.2	Peak	Vertical
11115.0	31.2	17.5	48.7	82.3	-33.6	Peak	Vertical
High Channel							
47.5	0.7	20.3	21.0	82.3	-61.3	Peak	Horizontal
97.4	1.3	18.2	19.5	82.3	-62.8	Peak	Horizontal
59.6	3.5	19.7	23.2	82.3	-59.1	Peak	Vertical
124.6	3.8	15.9	19.7	82.3	-62.6	Peak	Vertical
4833.5	36.3	3.8	40.1	82.3	-42.2	Peak	Horizontal
9950.5	33.7	14.5	48.2	82.3	-34.1	Peak	Horizontal
4978.0	35.4	3.6	39.0	82.3	-43.3	Peak	Vertical
11506.0	31.5	17.7	49.2	82.3	-33.1	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	LTE Band 5, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
54.7	5.6	20.3	25.9	82.3	-56.4	Peak	Horizontal
654.7	8.9	27.7	36.6	82.3	-45.7	Peak	Horizontal
54.3	9.6	20.3	29.9	82.3	-52.4	Peak	Vertical
479.6	8.1	24.8	32.9	82.3	-49.4	Peak	Vertical
1646.0	50.7	-5.5	45.2	82.3	-37.1	Peak	Horizontal
10732.5	31.7	16.5	48.2	82.3	-34.1	Peak	Horizontal
1646.0	50.3	-5.5	44.8	82.3	-37.5	Peak	Vertical
2470.5	41.2	-2.7	38.5	82.3	-43.8	Peak	Vertical
Middle Channel							
46.0	6.3	20.1	26.4	82.3	-55.9	Peak	Horizontal
435.9	7.2	23.8	31.0	82.3	-51.3	Peak	Horizontal
55.7	11.3	20.2	31.5	82.3	-50.8	Peak	Vertical
446.6	8.3	24.0	32.3	82.3	-50.0	Peak	Vertical
1671.5	51.8	-5.6	46.2	82.3	-36.1	Peak	Horizontal
10494.5	32.7	15.9	48.6	82.3	-33.7	Peak	Horizontal
1671.5	54.0	-5.6	48.4	82.3	-33.9	Peak	Vertical
2504.5	40.1	-2.5	37.6	82.3	-44.7	Peak	Vertical
High Channel							
47.0	6.0	20.2	26.2	82.3	-56.1	Peak	Horizontal
578.5	8.2	26.6	34.8	82.3	-47.5	Peak	Horizontal
55.2	10.7	20.2	30.9	82.3	-51.4	Peak	Vertical
553.3	7.6	26.2	33.8	82.3	-48.5	Peak	Vertical
1697.0	54.2	-5.7	48.5	82.3	-33.8	Peak	Horizontal
2547.0	39.1	-2.9	36.2	82.3	-46.1	Peak	Horizontal
1697.0	50.1	-5.7	44.4	82.3	-37.9	Peak	Vertical
2547.0	41.9	-2.9	39.0	82.3	-43.3	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	LTE Band 71, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
50.9	4.8	20.4	25.2	82.3	-57.1	Peak	Horizontal
342.8	6.5	22.4	28.9	82.3	-53.4	Peak	Horizontal
58.1	10.0	19.9	29.9	82.3	-52.4	Peak	Vertical
415.1	6.7	23.5	30.2	82.3	-52.1	Peak	Vertical
1323.0	47.5	-4.7	42.8	82.3	-39.5	Peak	Horizontal
1986.0	41.1	-4.3	36.8	82.3	-45.5	Peak	Horizontal
1323.0	54.0	-4.7	49.3	82.3	-33.0	Peak	Vertical
1986.0	45.0	-4.3	40.7	82.3	-41.6	Peak	Vertical
Middle Channel							
56.7	6.6	20.1	26.7	82.3	-55.6	Peak	Horizontal
431.6	7.3	23.8	31.1	82.3	-51.2	Peak	Horizontal
57.2	11.1	20.0	31.1	82.3	-51.2	Peak	Vertical
61.5	11.5	19.3	30.8	82.3	-51.5	Peak	Vertical
1357.0	46.1	-4.8	41.3	82.3	-41.0	Peak	Horizontal
2037.0	42.4	-4.0	38.4	82.3	-43.9	Peak	Horizontal
1357.0	47.4	-4.8	42.6	82.3	-39.7	Peak	Vertical
2037.0	44.3	-4.0	40.3	82.3	-42.0	Peak	Vertical
High Channel							
55.7	5.5	20.2	25.7	82.3	-56.6	Peak	Horizontal
514.0	8.5	24.9	33.4	82.3	-48.9	Peak	Horizontal
56.7	10.0	20.1	30.1	82.3	-52.2	Peak	Vertical
101.3	5.7	18.6	24.3	82.3	-58.0	Peak	Vertical
1399.5	49.9	-4.8	45.1	82.3	-37.2	Peak	Horizontal
2096.5	40.6	-3.1	37.5	82.3	-44.8	Peak	Horizontal
1399.5	49.0	-4.8	44.2	82.3	-38.1	Peak	Vertical
2096.5	43.0	-3.1	39.9	82.3	-42.4	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Appendix B - Test Setup Photograph

Refer to “2209RSU059-UT” file.

Appendix C - EUT Photograph

Refer to “2209RSU059-UE” file.